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resulting amino nitrile or cyanohydrin intermediate with a nitrilase or a polypeptide having nitrilase activity, wherein the nitrilase is sufficiently active to perform the hydrolysis in the presence of the reaction components, under conditions and for a time sufficient to produce the carboxylic acid.

In another aspect of the invention, there are provided compounds produced by the methods set forth herein.

In yet another embodiment, the invention provides nitrilase polypeptides and nucleic acid sequences encoding such nitrilase polypeptides. It should be understood that these nitrilase polypeptides are illustrative of polypeptides useful in the method of the invention, however, the method is not limited to the use of these particular polypeptides. In one aspect, the invention provides a substantially purified polypeptide having an amino acid sequence as set forth in SEQ ID NO:2 or SEQ ID NO:4 and sequences having at least 70% identity thereto and having nitrilase activity.

In another aspect, the invention provides an isolated nucleic acid sequence encoding an amino acid sequence as set forth in SEQ ID NO:2 or SEQ ID NO:4 and sequences having at least 70% identity thereto and having nitrilase activity, and fragments thereof that hybridize to the nucleic acid sequence.

DETAILED DESCRIPTION OF THE INVENTION

In accordance with the present invention, there are provided methods for producing enantiomerically pure α-substituted carboxylic acids. The methods of the invention include contacting an aldehyde or ketone with a cyanide-containing compound, preferably a metal or gaseous cyanide compound, and an ammonia-containing compound or an ammonium salt or an amine, and stereoselectively hydrolyzing the resulting amino nitrile or cyanohydrin intermediate with a nitrilase, wherein the nitrilase is sufficiently active to perform the hydrolysis in the presence of cyanide and ammonia. This stereoselective synthesis is outlined in Scheme 1.